

Draft Environmental Assessment

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Stream Bank Protection at Big Delta State Historical Park

Tanana River near Big Delta, Alaska

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Abstract: This document describes alternatives for protecting the Tanana River shoreline adjacent to Big Delta Historical Park (Park) from further erosion. Alternatives considered in this environmental assessment include: 1) No Action, 2) Combination of Bio-engineering Methods, and 3) Combination of Bio-engineering Methods Including Construction of Two Vanes. The selected alternative must balance competing resource needs by protecting the Park from further shoreline erosion while minimizing adverse impacts to essential fish habitat for spawning fall chum salmon. Alternative 3 is the preferred alternative. This document fulfills requirements of the National Environmental Policy Act and the Natural Resources Conservation Service's National Watersheds Manual.

Prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended, (16 USC 1001-1008), and in accordance with National Environmental Policy Act of 1969, Public Law 91-190, as amended, (42 USC 4321 et seq.). Financial assistance would be provided under the authority of PL 83-566, Watershed Protection and Flood Prevention Act, using funds earmarked and described for use in Public Law 107-76, Title VII, Section 754.

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Appendix A. Rika's Roadhouse – A Discussion on Bank Protection Alternatives,
November 2004, Prepared For U.S. Fish and Wildlife Service Fairbanks Fish and
Wildlife Field Office By Christopher H. Roach P.E., Consulting Engineer

Appendix B. Conceptual Design – Stream Bank Protection at Big Delta State Historical
Park, April 15 2005, Prepared by Christopher H. Roach P.E., Consulting Engineer

Chapter I

Background

In March 2004, the USDA Natural Resources Conservation Service (NRCS), Salcha-Delta Soil and Water Conservation District (SDSWCD) and State of Alaska Department of Parks and Outdoor Recreation (ADNR-DPOR) released the Big Delta State Historical Park Environmental Assessment (NRCS 2004). The Big Delta State Historical Park Environmental Assessment (EA) considered seven structural and non-structural alternatives that were developed by the University of Alaska Fairbanks (UAF 1998), the US Army Corps of Engineers (USACE 2000) and NRCS (NRCS 2004). The following summary discussion of alternatives was taken from the EA.

Future Without Project (No Action Alternative), Alternative 1

This alternative would result in the eventual loss of the historical park. Historic properties could fall into the river due to the natural process of erosion. The losses would also include utility line supports, gravel paths and roads, as well as various other park facilities. Without the vegetative manipulation due to maintenance, regrowth of the riparian and forest area would occur. Eventually the site would reestablish with the vegetative and low disturbance features necessary for wildlife to regain use of the area commensurate with the disturbance regime. The essential fish habitat would continue to be impacted by the hydrologic cycles as it is presently.

Relocation of the Threatened Facilities, Alternative 2

This alternative would require that all facilities and structures near the riverbank edge be moved to avoid being lost within the near future. Erosion threats would require the movement of Rika's Roadhouse, the WAMCATS cabins, the Alaska Road Commission Scales, the Prospector's Train, the Ferryman's Cabin and major power line supports crossing over the river. Further complicating this action is the historic and fragile nature of the historic properties and loss of the historical site integrity. A 1987 restoration of Rika's Roadhouse was accomplished over the course of a year at a cost over \$1 million. Relocation would require complete dismantling of the structure, log by log. Lack of suitable land for relocation of the structures and excessive costs preclude this alternative from being viable. Assuming that additional land could be purchased, the cost estimate for relocating threatened public structures and facilities is estimated to be \$3,500,000 (USACE 2000). This alternative was determined to not effectively address the erosion concerns because it did not maintain the integrity of the Big Delta State Historical Park even though disturbance to spawning fall chum habitat was minimized. Therefore, this alternative is not evaluated for impacts on identified concerns.

Facility Retention with Modification of Vegetation Maintenance Practices & Revegetation, Alternative 3

This alternative retains all facilities at their present locations while requiring changes in the upland management practices. Existing maintenance practice was to cut

willows along the riverbank at ground level and retain all large trees. This alternative would require that all large trees in danger of falling into the river be topped to reduce soil loading and prevent vortex scour. It would also require that all maintenance activity that cut and removed woody vegetation from the riverbank be ceased. The woody vegetation would be maintained according to the Vegetation Re-establishment Plan (NRCS 2004) developed by NRCS in conjunction with State Parks landscape architect. The vegetation re-establishment portion of this alternative would include installations of live stakes and live fascines to supplement the existing vegetation. Plantings of native trees, shrubs and forbs would also improve the diversity and density of the riparian buffer. Approximately five to ten years of monitoring the bank and maintaining the vegetation would be necessary to evaluate the long-term effectiveness. The cost of this alternative was estimated to be \$40,000. This alternative was determined to not sufficiently address the objective of protecting the riverbank from erosion to protect the historic district because protection would not be provided quickly enough. This alternative does meet the objective of minimizing disturbance to spawning fall chum habitat.

Groins, Alternative 4

This plan consisted of placing rock groins ten feet tall at 45-degree angles (pointing upstream) to the riverbank to deflect the flow away from the eroding bank. Groins would be higher than design flood flows by approximately one foot. The groins would extend 150 feet out into the river. The resulting reduction in velocities adjacent to the bank would arrest the erosion problem. Lower velocities would facilitate sedimentation in between the groins resulting in a build-up of the river bottom, which would provide further protection of the riverbank. The estimated quantity of rock required was 12,600 cubic yards (yd³). This alternative had several disadvantages. The long groins could be a hazard to high-speed riverboat traffic as boaters frequently use this stretch of river. Marking the groin structures would be impractical due to the possible high flows, debris impacts, and ice impacts during breakup. The impact on fish spawning-gravel habitat would be significant. The estimated footprint area was 55,000 square feet for seven groins, representing a 9% reduction in the available spawning area for fall chum. Recent surveyed cross-sections showed that the broad shallow gravel shelf, which is important chum salmon spawning habitat, extends from about 50 feet to 150 feet out from the top of the river bank line. While groins deflect the flow in the river out toward the center of the channel, they do not provide direct protection of the bank itself. Protection would depend on the buildup of sediments and re-establishment of natural bank slope as velocities were reduced adjacent to the bank.

Riprap Revetment, Alternative 5

This plan consisted of placing a riprap revetment structure along the bank from the existing top-of-bank line down to the existing river bottom on a 1.5H: 1V side slope. The revetment structure would extend approximately 45 feet out into the river from the top-of-bank. An excavated rock toe at the riverside edge would be required for stability and scour protection. The estimated quantities were 4,800 yd³ of armor rock, 2,300 yd³ of secondary rock and 250 yd³ of topsoil. The length of the

revetment was 1,030 feet. The footprint of the riprap in the spawning area was approximately 30,000 square feet. To avoid chum salmon spawning gravels between stations 14+40 to 16+60 (approximately 220 feet), the excavated toe would need to be omitted. The riprap would not have a toe key in this section. Filter rock, instead of geo-textile to bed the rock, would be used to maintain ground water flow through the bank. Ground water flow bathes salmon eggs in the gravel. Revegetation along the bank for stability, aesthetics, and wildlife habitat was a component of this project. The revetment would stabilize the mature trees threatened with uprooting.

Riprap Revetment with Soil Wraps and Brush Layers, Alternative 6

This plan consisted of constructing riprap to a crest elevation of approximately two feet lower than the top-of-bank elevation. Vegetation, topsoil, and filter fabric would be placed on the top two feet for aesthetic and wildlife habitat purposes. Vegetation re-establishment would be necessary if high flows in the river washed it out. Overtopping of the revetment could further damage the unprotected bank behind the revetment and possibly jeopardize the integrity of the remaining structure. Failure by overtopping could result. It was determined that this alternative would not effectively address the erosion concerns. Therefore, this alternative was not evaluated for impacts on identified concerns.

Rock Barbs, Alternative 7 (Preferred Alternative)

This plan consisted of installing four rock barbs. Barbs are low rock weirs rising 1.5 feet above the streambed. The barbs would extend into the stream approximately 65 feet, angling about 45 degrees upstream. The intent of the barbs was to modify flow patterns and bed topography. The barbs are very low structures which are designed to be overtopped during channel-forming flow events. The barbs are designed to relieve direct streambank pressure from flow. When revegetation is used in conjunction with barbs favorable conditions result. The vegetation provides for energy dissipation during high water events; root structure enhances bank stability; and increased density and diversity improves the riparian buffer. Therefore, in conjunction with the barbs, a vegetation re-establishment plan was developed to address the disturbed sections of bank and to enhance the existing landscape and riparian buffer. The locations of the proposed barbs were selected not only to develop the desired hydraulic action along the site, but also to avoid essential spawning areas. The footprint of each barb averages 1500 square feet. Approximate total area of spawning habitat designated by Division of Commercial Fish as prime spawning habitat for fall chum salmon in this location is greater than 600,000 square feet. The total area disturbed by the footprint of the barbs was approximately 1% of the spawning habitat. Estimated quantities for construction of the four barbs were 1900 cubic yards of rock and 2050 cubic yards of excavation. The total length of bank protected by barbs was approximately 1000 feet. The vegetation component of this alternative would be installed in accordance with the Vegetation Re-establishment Plan. Estimated installation cost was \$340,000. Average annual operation and maintenance costs were estimated to be \$350.00.

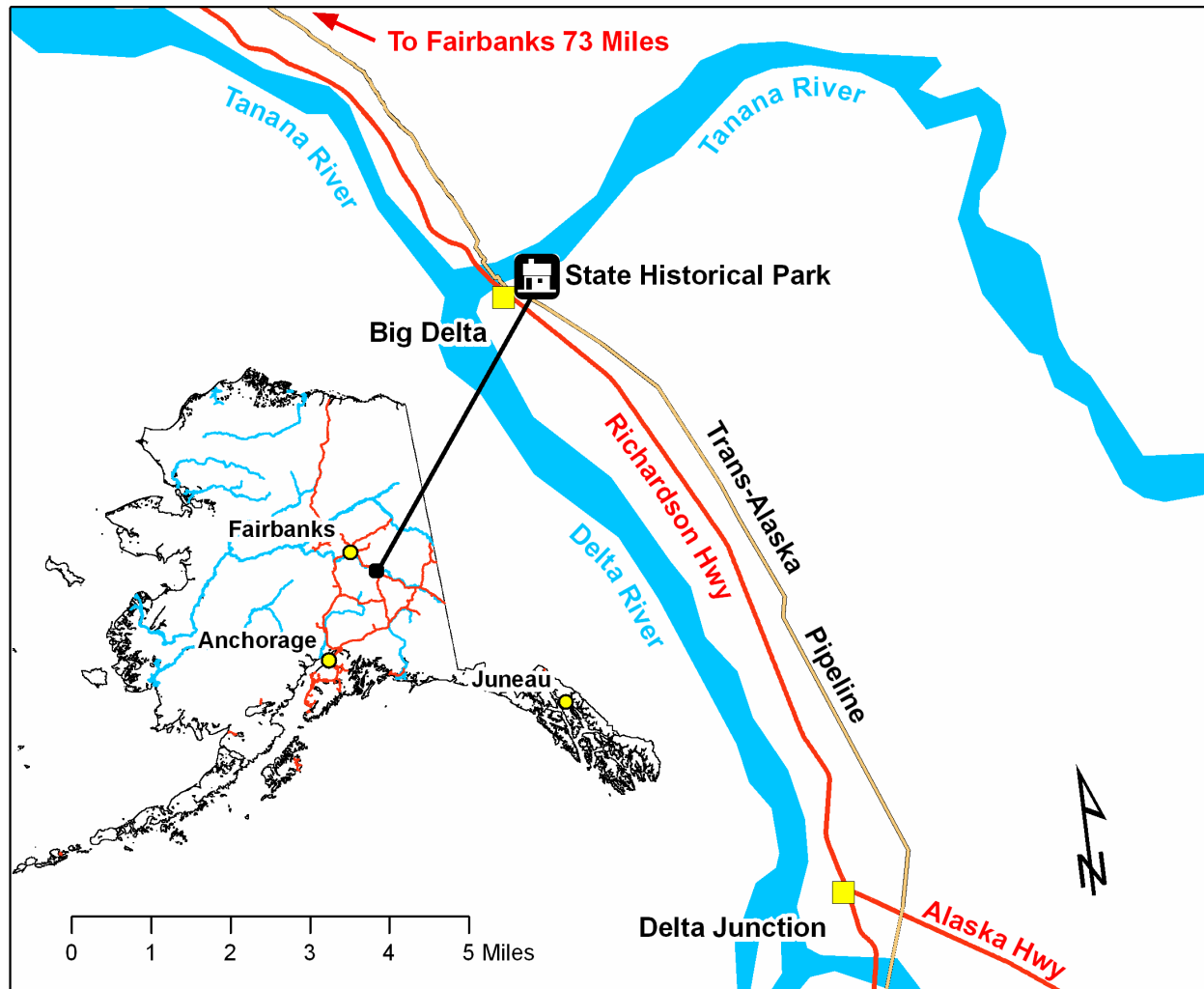
The 2004 EA selected Rock Barbs (Alternative 7) as the preferred alternative. The preferred alternative was analyzed throughout the EA (NRCS 2004). Refer to the EA for a more in-depth discussion of the alternatives.

Publication of the EA and Finding of No Significant Impact (FONSI) created controversy between project advocates and several resource agencies. Resource agencies feared that prime chum salmon spawning habitat bordering the Park would be significantly impacted with the Rock Barbs Alternative. Because these controversial issues were not resolved, the permits needed by ADNR-DPOR have not been issued.

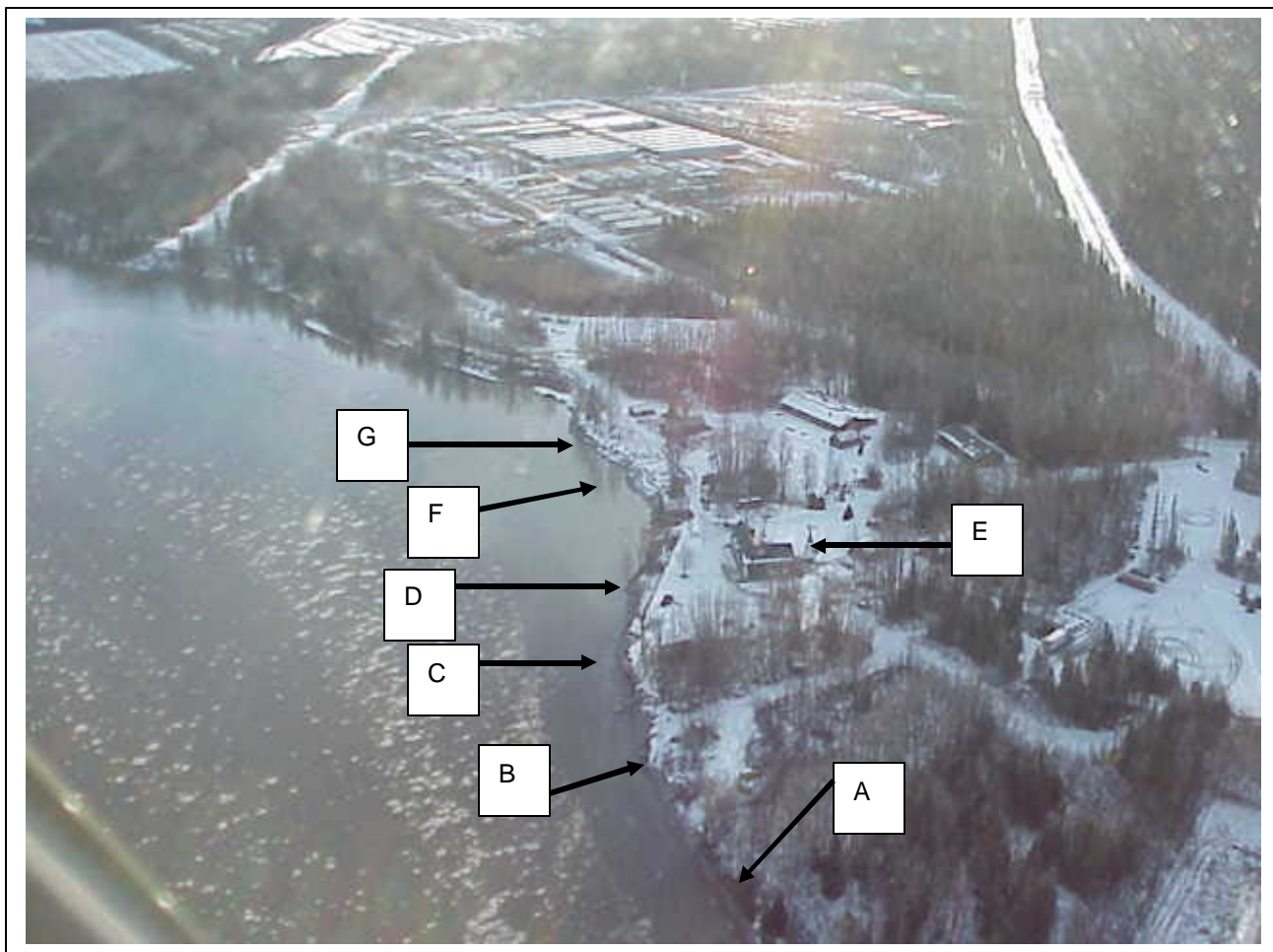
After much debate between advocates for the Park and advocates for the fishery, it was agreed that both resources are equally important and that a plan should be identified and implemented to preserve both the Park and adjacent fall chum salmon spawning habitat. As discussed above, past strategies proposed to protect the Park either involved in-stream structures that would negatively impact spawning habitat or require the relocation of historic structures that would degrade the historical integrity of the site. In November of 2004, representatives from the U.S. Fish and Wildlife Service (Service), NRCS, ADNR-DPOR, and Alaska Department of Natural Resources Office of Habitat Management and Permitting (ADNR-OHMP) met to discuss methods to stabilize the riverbank that would least impact fall chum salmon spawning habitat while still providing a reasonable degree of protection to the Park. The representatives agreed that both the historical site and the essential fish habitat were important resources and that both should be protected. The representatives agreed to explore methods that used a combination of bio-engineered bank stabilization techniques, vegetation management, and monitoring/maintenance plans. This environmental assessment is the result of these discussions and considers new alternatives.

Purpose and Need for Action

Big Delta State Historical Park is situated on the outside bank of a wide bend on the south side of the Tanana River, a short distance upstream from the confluence of the Tanana and Delta Rivers (Figure 1). The nearby community of Big Delta is located along the Richardson Highway about a half mile from the Park, and 73 miles southeast of Fairbanks, Alaska. The Park consists of numerous restored historic buildings, including Rika's Roadhouse, and is a popular stop for tourists. The State of Alaska and the Park concessionaire have spent a significant amount of time and money in recent years to restore the historic buildings and construct improvements to meet visitor demands on the Park. Eight structures in the Park are listed as the Big Delta Historic District on the National Register of Historic Places. The Park is a key statewide tourism infrastructure facility with over 34,000 visitors annually. The Park is also a Type A "Flagship" highway wayside with full service visitor amenities, including a restaurant, gift shop, flush toilets, camping, picnicking, dump station for motor homes, walking trails, and interpretive exhibits (cited in the State of Alaska's Trails and Recreational Access for Alaska Highway Corridor Assessments, NRCS 2004). Riverbank erosion has, and will continue to threaten the historic site and buildings at the Park (Figure 2).



**Figure 1 – Project
Location Map**



- Point A: Bank downstream of private property (downstream of Big Delta State Historical Park)
- Point B: Private property downstream of Big Delta State Historical Park
- Point C: Boat launch, lower section of Park property in front of Ferryman's cabin
- Point D: Point in front of Rika's Roadhouse Building
- Point E: Rika's Roadhouse Building
- Point F: Alcove upstream of Rika's Building with shallow shelf and log crib ferry dock structure
- Point G: Point upstream of Rika's Roadhouse Building

Figure 2: Aerial oblique photo, looking upstream at Big Delta State Historical Park

Also of significance is the exceptional fall chum salmon spawning habitat located in the Tanana River along the Park's shoreline. A shallow shelf extends into the river approximately 150 feet and is characterized by freshwater upwelling required by spawning fall chum salmon in late October, November and into December. This situation occurs only at specific sites in the Tanana River, making this type of spawning habitat unique and limited. Degradation or loss of any of these sites may affect populations required to sustain Alaska's subsistence use of the chum salmon in the Yukon River drainage. An estimated 37% (5-year average 2000-2004) of the Yukon River drainage fall chum salmon spawn in the Tanana River. Some years the estimated spawning rate is as high as 50% (pers. comm. with ADF&G Fisheries Research Biologist Bonnie Borba 2005). Aerial surveys (1 day per season) have documented as many as 20,000 fall chum salmon spawning adjacent to the banks of the Park. The future of existing commercial utilization of fall chum salmon that forms an integral part of the subsistence way of life is also at risk. In recent years, the fall chum salmon runs have been far less than previous years, prompting restrictions in commercial and subsistence harvest of this species. Past harvest restrictions demonstrate that the current chum production and current needs are in a delicate balance.

Decision Needed

A plan that will protect Park structures from damage or loss from bank erosion must be selected from several potential solutions. Criteria used for making the decision include:

1. The plan must substantially reduce the risk of bank erosion and provide a means to monitor, modify, and maintain bank stabilization strategies.
2. The plan must minimize adverse impacts to fall chum salmon spawning habitat bordering the Park.

Chapter II

Description of Alternatives (Including Preferred Alternative)

Three alternatives, including a No Action alternative, are presented and evaluated in this EA. The alternatives provide various levels of riverbank protection for the Park and varying levels of impacts to fall chum salmon spawning habitat. This chapter discusses the development and description of the alternatives considered, a comparison of the alternatives, and the identification of the preferred alternative.

Development and Description of Alternatives

The objectives of the bank erosion protection alternatives at the Park include the following:

- Minimize the use of in-stream structures so that chum salmon spawning beds can be protected.
- Develop a strategy that directly addresses the observed bank erosion mechanisms.

- Provide for detection of future bank movement in the gravel/cobble slopes below ordinary high water (OHW).
- Provide for flexibility to take action in the future as necessary to protect the toe of the slope below OHW if unacceptable movement is detected.

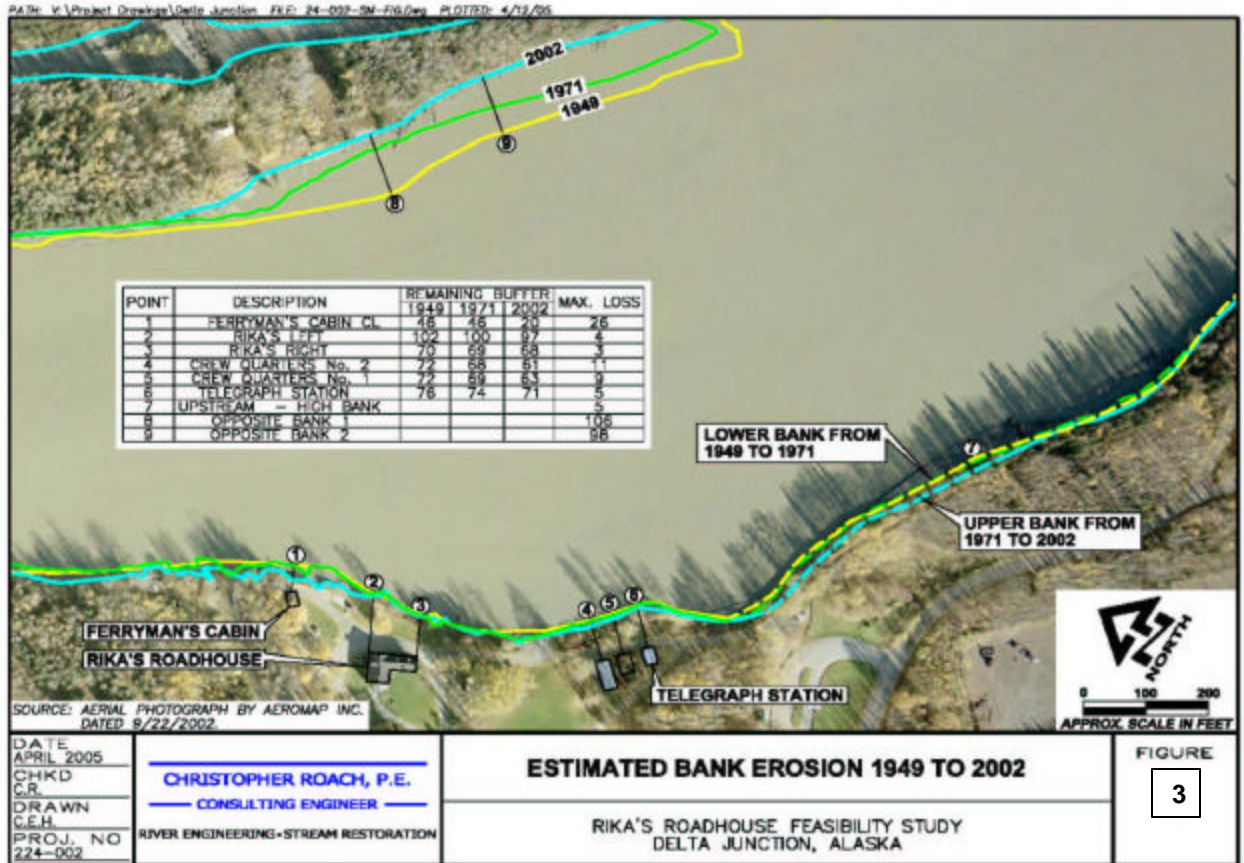
Restoring the vegetation and bank stability **above** OHW would help re-establish the integrity of the bank throughout this reach of the Tanana. Bank erosion has occurred predominately above OHW and was likely the result of past and continued vegetation clearing, foot traffic, and changes in vegetation type. Restoring the integrity of the upper bank requires a tailored approach to address the changes in bank height, soils, historic riparian vegetation community, remaining vegetation, relative degree of bank instability, and historic land loss throughout the reach.

In order to meet the above objectives, the following three alternatives are considered. The alternatives are listed according to the level of riverbank protection they would most likely achieve and according to the severity of impact they would most likely have on fall chum salmon spawning habitat. Alternatives are listed in order from the lowest (1) to the highest (3) level of protection for the cultural resources at the Park, and from the lowest (1) to highest (3) level of disturbance to the spawning habitat bordering the Park's riverbank.

Alternative 1 – No Action: There would be no proactive riverbank protection or stabilization actions and the river would be allowed to migrate across the floodplain naturally without intervention. Woody vegetation would continue to be removed or thinned along the riverbank, overland flow from various upland sources would continue to flow across the unprotected riverbank at concentrated locations, and yard waste would continue to be discarded on the bank. Other than casual observation, no formal monitoring program would be implemented.

Alternative 2 – Combination of Bio-engineering Methods: This alternative would use a combination of several bio-engineering streambank stabilization techniques. The technique used would depend on bank erosion mechanisms observed at different locations along the bank.

The most significant land loss has occurred just downstream from Rika's Roadhouse near the Ferryman's cabin and boat launch (between Points 1 and 2 - Figure 3). Treatment of this 220' section would involve reconstructing the bank by constructing a bankfull bench using root wads to buttress the upper slope, placing a riprap apron under the root wads at the toe of the slope, and reinforcing the root wads and rocks placed above the root wads with an organic slurry. Root wad bowls would be anchored into the bank with the root mass extending into the river and over the reinforced toe (see Appendix B – Conceptual Design for more details). This more aggressive approach would help to restore the bank to its pre-erosion position before the 1997 high water event and would allow an increased buffer to be established between existing structures and the restored edge of the bank.



Between points 2 and 3 on Figure 3, small riprap was placed in the toe of the bank in the 1950's by the military. That part of the bank has been stable for over 50 years and does not need to be restored.

In areas with minor erosion a variety of techniques would be used to stabilize the bank in place and allow existing vegetation to regenerate. Between points 3 and 4, Figure 3, coir logs or soil wraps would be anchored into the bank to provide protection against entrainment and transport of soils at the base of the upper soil layer. Willow bundles would be placed above the coir logs in order to rapidly increase vegetation coverage and rooting density. Biodegradable Geofabric would be placed over exposed soils and re-seeded to provide rapid surface erosion protection with grass.

In order to correct bank erosion at the duck pond overflow area (halfway between points 3 and 4 on Figure 3), effluent from the pond would be drained through an outfall (i.e. French drain) designed to eliminate surface flow over the bank and allow free draining through the bank. This would prevent excess pore pressure buildup within the bank and improve integrity of the bank at that location.

In areas with no active bank erosion (Figure 3 between points 4 and 7), vegetation would be actively planted and managed to reduce the risk of future bank erosion.

Alternative 3 – Combination of Bio-engineering Methods Including Construction of Two Rock Vanes: This alternative would incorporate Alternative 2 and incorporate 2 in-stream vane structures. Two vane structures would be constructed on the bed of the Tanana River on either side of the 220' root wad bio-engineered structure in order to protect the root wads as well as the private property downstream of the Park. The vane dimensions would be approximately 5 feet wide, 60 feet long and 3 feet high (from the streambed) and constructed with very large rock. Approximately 33 cubic yards of material would be used for construction of the vanes in the Tanana River. Each vane would extend upstream at a 15 to 20 degree angle from the bank and slope gently (2%-5% slope) into the river. Rock vanes are constructed with large boulders placed with a track hoe. Vane structures reduce velocity and shear stress near the banks, thus providing erosion protection. This alternative would withstand a 50-year flood event on the Tanana River. See Appendix B (Conceptual Design) for a full discussion of this alternative.

The preferred alternative is Alternative 3.

Chapter III

Environmental Consequences

This chapter describes the significance of the resources at issue and the known or expected impacts of each alternative on these resources. Extensive agency and public involvement have indicated that the overriding issue involves protection of fall chum spawning and rearing habitat, while still protecting the historic structures at the site. These resources will be discussed first, followed by other resources which may be affected as a consequence of implementing the alternatives.

Cultural Resources

The site of the Park was inhabited by natives long before Euro-American explorers and settlers used the site. The site is listed on the National Register of Historic Places as Big Delta Historic District (XBD-00132). Contributing properties near the riverbank include Rika's Roadhouse (XBD-00059), the Alaska Road Commission Scales (XBD-00142), the Prospector's Trail (XBD-00134), the Ferryman's Cabin (XBD-00121), and the McCarty Trading Post site (XBD-00148). Non-contributing properties near the river include the bridge (XBD-00151), Rika New House Site (XBD-00150), the animal pens and storage shed, and the flagpoles at the McCarty Telegraph Station site.

This site was well-known to local residents as a fall spawning area for chum salmon, at least since the 1930's. Salmon were speared along the south bank of the Tanana River and were hauled by the truckload to be sold to local fox farms (NRCS 2004).

Holmes (NRCS 2004) identified a pre-contact/contact period of Athabascan occupation under the remains of an early 20th century trading post. Fire cracked rock, lithic flakes of quartz and chert, a chert side scraper, glass beads, and animal bones were associated with this component of the site. This site is near the riverbank and could possibly be affected by ground disturbance activities along the bank.

A survey to assess project effects was conducted in August 2000 by Diane Hanson, USACE archaeologist, and Charles Holmes of the State Historic Preservation Office. The entire alignment was surveyed and several test pits excavated. Some faunal material was found, as were historical items such as glass, rifle shells, metal nail, and a red paint chip. Report of findings and literature search is contained in the Hanson 2000 Survey (NRCS 2004). Coordination with the State Historic Preservation Officer is ongoing.

The known or expected impacts of each alternative on the cultural resources are:

Alternative 1 – No Action: The Tanana River would be allowed to migrate across the floodplain naturally, without intervention, possibly resulting in the high risk of damage or loss of historic structures.

Alternative 2 – Combination of Bio-engineering Methods: Rebuilding and stabilizing the soils of the upper bank, stabilizing the toe of the bank, re-establishing vegetation above bankfull within the riparian zone and sound vegetation management on the uplands would substantially reduce the risk to the structures at the historic site. Strict implementation of a project vegetation maintenance plan (Appendix B – Conceptual Design) would further reduce the risk to the site. However, without in-stream structures like vanes, there would be some increased risk to the cultural resources of the Park. It is possible for part or all of the bio-engineered methods to fail in the event of a major flood.

Alternative 3 – Combination of Bio-engineering Methods Including Construction of Two Vanes: As in Alternative 2, rebuilding and stabilizing the soils of the upper bank, stabilizing the toe of the bank, re-establishing vegetation above bankfull within the riparian zone and sound vegetation management on the uplands would substantially reduce the risk to the structures at the historic site. Constructing two vanes would substantially decrease the possibility of failure of the root wad structure during a high water event. The upstream vane would protect the root wad structure and divert water away from the bank at this point. The downstream vane would protect the private property below the Park (see Appendix B – Conceptual Design).

Fish Resources

The Tanana River is a migratory corridor for Chinook, coho and chum salmon. Other fish species include Arctic grayling, whitefish, northern pike, burbot, blackfish, and longnose sucker. The 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act Amendments mandate that federal agencies assess

the effects of federal projects on essential fish habitat and consult with the Department of Commerce (50 CFR 600.905-930). The Tanana River bordering the project site is an important spawning area for fall chum salmon and is considered essential fish habitat under the Magnuson-Stevens Act. Fall chum salmon are also listed as a stock of concern by the Alaska Board of Fisheries.

Numerous fish surveys have shown the high productivity for spawning fall chum salmon bordering the Park. In 1972, an Alaska Department of Fish and Game (ADF&G) Commercial Fish Division Survey documented over 8,350 fall chum salmon between the Trans-Alaskan Pipeline Service (TAPS) crossing and the first upstream island located just upstream of the Park. A 1979 survey taken on November 8 reported 20,820 fall chum salmon between the Richardson Highway and the mouth of Blue Creek. The survey was conducted after peak spawning and was rated as fair. A 1994 survey counted 12,500 fall chum salmon between the TAPS crossing and the mouth of Blue Creek. According to the ADF&G Commercial Fisheries Division, most chum salmon spawning activity in this reach of the river is concentrated from the TAPS crossing to upstream of Rika's Landing within the area of the upwelling bordering the Park (ADF&G 2000).

The subsistence fishery is a critical element of life along the Yukon and Tanana Rivers resulting in an active trade and barter system in the Yukon River drainage. Downriver communities, particularly near the mouth of the Yukon, rely on money generated from commercial fisheries to provide income. The drainage-wide fall chum salmon harvest in 2002 was the second lowest on record. Under a normal production regime, the spawning site encompassing the project area could provide a harvestable surplus of 10,000 to 20,000 fall chum salmon (NRCS 2004).

The known or expected impacts of each alternative on fish resources are:

Alternative 1 – No Action: There would be no risk of disturbance to the spawning areas. Natural processes would determine the future condition and size of the spawning and rearing areas.

Alternative 2 – Combination of Bio-engineering Methods: Since none of the bio-engineering methods extend into the river or spawning grounds, there would be no disturbance to the spawning areas used by chum salmon. Because this alternative would involve no in-stream excavation or fill, there would be little risk of disturbance to the spawning and rearing habitat. The roots in the root wad structures would extend into the Tanana River and could provide protection habitat for emerging chum salmon fry and resident fish.

Alternative 3 – Combination of Bio-engineering Methods Including Construction of Two Vanes: Using a combination of bio-engineering methods would not impact spawning habitat used by chum salmon and could possibly enhance habitat as stated in the discussion of Alternative 2 above. The placement of 2 in-stream vanes would, at a minimum, disturb spawning within the footprints of the vanes. The footprint of each

vane is approximately 300 square feet. The location of both vanes at the downstream end of the Park's riverbank would minimally impact spawning salmon because of higher water depth (pers. comm. with Kevin Boeck Fisheries Biologist – ADF&G Commercial Fish 2005). The vanes would lower the risk of losing newly constructed bio-engineered structures to the Tanana River (during flood stage).

Summary of Impacts to Cultural Resources and Spawning Habitat		
Alternative	Impact to Cultural Resources	Impact to Spawning Habitat
(1) No Action	Bank erosion would continue unchecked with high risk of damage or loss of historic structures.	No risk of disturbance. Natural processes would determine future condition.
(2) Method 1 - Construct Soil Wrap Lifts with No Toe Protection	Less risk of loss or damage than Alternative 1.	No risk of disturbance.
Method 2 - Construct Soil Wrap Lifts with Toe (Riprap) Protection	Less risk of loss or damage than Alternative 1. Toe protection would add integrity to upper bank and lessen erosion.	Little risk of disturbance because this alternative involves no in-stream excavation or fill.
Method 3 - Construct Bankfull Bench with Root Wads and Reinforce Toe with Riprap Apron	The Park may gain land if root wads collect sediment. The riverbank would increase in width, further protecting the Park's structures.	Roots from the root wad structure would provide salmon and resident fish rearing habitat but have little effect on spawning habitat.
(3) Combination of Bio-engineering Methods from Alternative 2. Includes 2 In-stream Structures (Vanes) Constructed Above and Below the Root Wad Bank Structure.	River flow directed away from the shoreline by the vanes would provide additional protection to bio-engineered root wad structure and Park historic buildings.	The placement 2 vanes would disturb spawning habitat within the footprints of the vanes (approximately 300 sq. ft/vane). Location of the vanes at the downstream end of the project would minimally impact the salmon because of water depth. The vanes would lower the risk of losing newly constructed bio-engineered structures to the Tanana River.

Threatened, Endangered and Sensitive Species

The proposed project site is within the range of the American peregrine falcon, which was removed from the list of threatened and endangered species. No other candidate or state sensitive species have been identified as concerns. None of the alternatives are likely to adversely affect the peregrine falcon. Fall chum salmon have been classified as a stock of concern by the Board of Fisheries and as a yield of concern. Environmental consequences of alternatives are discussed in the “Fish Resources” section above.

Vegetation

Mixed deciduous forest composed of balsam poplar and white spruce grows along the Tanana River in the well-drained soils. The understory is composed of willow, alder, rose, raspberry, and fireweed. The species composition at the Park has been altered by trail clearing, by planting grass between buildings, and by selectively removing vegetation along the riverbank. Alternative 1 does not provide for a change in management of shoreline vegetation and would not proactively re-establish the shoreline vegetation that has been thinned or eliminated along portions of the bank. Alternatives 2 and 3 provide for re-establishment and management of bank vegetation. Both Alternatives 2 and 3 call for strict implementation of a project vegetation maintenance plan (Appendix B – Conceptual Design).

Economic and other resource concerns

Alternative 1 – No Action: Seasonal high water and ice debris has potential to cause erosion of the river bank bordering Big Delta State Historical Park. The aesthetics of the river corridor are diminished as the bank is eroded and the riparian buffer narrows. The loss of the riparian buffer is compounded by the current practices of removing vegetation at the ground level in order to improve the view. Loss of the Park would translate into \$500,000 dollars annually being lost to the community through jobs and revenue from the tourism industry. The eroding bank is a potential safety hazard to park visitors.

Commercial Fish Division’s data base shows that the Yukon Area subsistence harvest total in 2002 was 19,674 fish. The average total subsistence harvest in this area for fall chum salmon in 1992-2001 was 113,675, and the average total for 1997-2001 was 60,618. The subsistence fishery is a critical element of life along the river as there is an active trade and barter system in the Yukon River drainage. Downriver communities, particularly near the mouth of the Yukon, also rely on money generated from commercial fisheries to provide income. Without the installation of the project, the economics of the fishery would continue to cycle as presently occurs.

Alternatives 2 and 3 would improve the width and density of the riparian buffer and may increase the diversity of native plants and wildlife. This may be of value to the park visitors. Safety hazards due to the existing eroding bank would no longer exist. Both alternatives are designed to protect the bank from erosion and reduce safety hazards to visitors. The aesthetic value of a bank stabilization project is subjective; however, it is more attractive to the sponsors than losing the structures of significant historic value to the river. With the bank erosion arrested, the historic park would continue to maintain its economic value to the community. There is potential for impacts on navigation with alternative 3. The vanes in alternative 3 would be marked with private navigational aids as required by the US Coast Guard. The average annual maintenance costs will be exceeded by the economic and historic benefits of preserving the historic park.

Project Interaction

Currently there are no existing federal projects having significant interactions with the proposed alternatives. The preferred alternative (Alternative 3) has been developed through interaction with the involved state agencies and is the selected alternative for implementation.

Risk and Uncertainty

The alternatives have varying degrees of risk and uncertainty. There is inherent risk associated with river work. The vane rock dimension is designed based on the tractive stress which would occur in a 50-year frequency flood event. The uncertainty of predicted values increases because of the limited flow data available on the Tanana River at this site. It is possible in a 50-year frequency event or larger flow event that there would be some movement of the rock. The risk for the Park is much higher for the No Action alternative than if any of the other alternatives are selected. If the preferred alternative failed, there might be a short-term navigational risk as rocks shifted in the channel. However, the project would still provide a level of protection to the Park until the damage could be repaired.

Rationale for Plan Selection

Federal policy requires selection of the plan that maximizes net National Economic Development benefits (NED plan) unless there are overriding reasons for exceptions. Exceptions may be made because of intrinsic benefits associated with improvements in environmental quality or cultural benefits. Project benefits were based on avoiding the costs of relocating the existing facilities at the Park and the cultural value of the Park in its original location. The concurrent goal of the project was to avoid or minimize disturbance to the essential fish habitat. The NED alternative was formulated to maximize net economic benefits for the Park and to provide the least disturbance to the essential fish habitat. Identification of a recommended plan by the project sponsors depends not only on the level of benefits provided but also on public acceptability, financial impact and an assessment of remaining risk and uncertainty.

Chapter IV

Monitoring

A key factor determining the long term stability of the project rests on soil stability above OHW. The rate of movement of the toe of the slope (cobbles and gravel) below OHW determines soil stability above OHW. If the streambed/toe of the slope below OHW erodes then the upper part of the slope could be undermined. Thus, a monitoring program would be put in place to assess the long term rates of movement of the toe of the slope below OHW throughout the reach. This would allow for detection of movement of the bank below OHW, provide a clear understanding of where toe erosion may be occurring, and predict the magnitude and rate of movement.

Annual monitoring of the reach in front of the Park would be performed by the Service. Several key locations along the reach would be surveyed each year. Monitoring would also assess changes in vegetation management on the uplands and in the riparian zone. If it is determined that the toe of the slope is subject to active erosion, then additional measures would be taken to stabilize the toe of the slope below OHW. These measures would involve placement of structures to increase the erosion resistance of the toe of the slope as well as to reduce hydraulic demand by reducing shear stress and flow velocity in the near bank region.

Monitoring of the bank to determine erosion rates would involve establishing several monumented cross section locations along the project site that would be re-surveyed annually. The annual survey would be best completed in fall after water levels have receded. Toe pins would be placed in the stream bed at the toe of the slope. Toe pins allow an accurate means of measuring the bank position. This approach would allow data from each year to be overlain and compared to develop an accurate understanding of long term erosion rates and where that erosion may be occurring. This plan would include a review of vegetation management practices and management practices for controlling foot traffic on the bank. The future integrity of the bank will rely heavily on maintaining a strong riparian vegetation community, so cutting and thinning of the vegetation would be carefully managed.

Foot traffic on the riverbank should be controlled to minimize trampling of bank vegetation and allow revegetation to succeed. In order to facilitate this, foot paths that are set back away from the bank should be developed. Boardwalks or platforms at viewing areas should be installed at discrete locations along the bank to allow for viewing the river while maintaining the integrity of bank vegetation.

Chapter V

Federal Permits, Licenses, and Necessary Entitlements

Project sponsors (ADNR-DPOR) are responsible for acquiring all necessary permits before construction can begin. The permits listed here should not be considered an all-inclusive list.

1. US Army Corps of Engineers Section 404 Clean Water Act
2. Alaska Department of Natural Resources, Office of Habitat Management and Permitting, Title 41 Fish Habitat Permit
3. Alaska Department of Natural Resources, Division of Mining, Land and Water, Right-of-Way or Land Use Permit
4. US Coast Guard Private Aid to Navigation

The proposed plan must be in full compliance with applicable environmental statutes:

1. Archaeological and Historic Preservation Act
2. Clean Water Act
3. Endangered Species Act
4. Fish and Wildlife Coordination Act
5. National Environmental Policy Act
6. National Historic Preservation Act

A cultural resources survey was conducted by the USACE, April 2001. An archaeologist would be on site during construction to monitor activities.

Chapter VI

References

Alaska Department of Fish and Game, Letter to File: Rika's Roadhouse-Trip Report, April 2000.

U.S. Army Corps of Engineers, Big Delta State Historical Park, Big Delta, Alaska, Section 14 Emergency Streambank Erosion Protection Project Report, Environmental Assessment and Finding of No Significant Impact, October 2000.

U.S.D.A. Natural Resource Conservation Service, Big Delta State Historical Park Streambank Protection Project Environmental Assessment, January 2004.

University of Alaska Fairbanks, Civil Engineering Department, Stream Bank Erosion and Alternative Protection Plans, Rika's Roadhouse and Landing, Big Delta State Historical Park, November 1998.

Chapter VII

Agencies and Persons Consulted

The Service, NRCS, and DNR-OHMP are the primary leaders in this planning process for protecting the Park from riverbank erosion while safeguarding fall chum spawning habitat. The SDSWCD, ADNR-DPOR and NRCS developed the January 2004 Big Delta State Historical Park Streambank Protection Project EA from which this EA was based. The US Army Corps of Engineers, University of Alaska Fairbanks - Civil Engineering Department and the US Geological Survey provided important base data, specifically topographical and hydraulic, that was used in the 2004 EA. The USACE developed a draft environmental assessment which was the source for much of the information in the 2004 EA. Coordination with the State Historic Preservation Officer regarding cultural resources and the Service regarding threatened and endangered species was successfully completed by the USACE for the purposes of a bank stabilization project in this location. Comments concerning this EA and FONSI were solicited from the following agencies, organizations and groups:

U.S. Army Corps of Engineers
U.S. Coast Guard
National Oceanic and Atmospheric Agency – Fisheries
Alaska Department of Fish and Game
Alaska Department of Natural Resources
Alaska State Historic Preservation Office
Alyeska Pipeline Services
Whitestone Farms, Inc.
Yukon River Drainage Fisheries Association